

Industrial Technologies Program



VOC and HAP Recovery Using Ionic Liquids

Ionic liquids used for absorption of VOCs and HAPs will lower emissions and reduce operating and energy costs

Manufacturing wood composites, paper, and lumber produces unwanted by-products, such as Volatile Organic Compounds (VOCs) and Hazardous Air Pollutants (HAPs). These by-products are difficult to manage because the concentrations are low. Current air pollution treatment technologies are not economically favorable due to high operating costs involving intensive resources and the formation of NO_x .

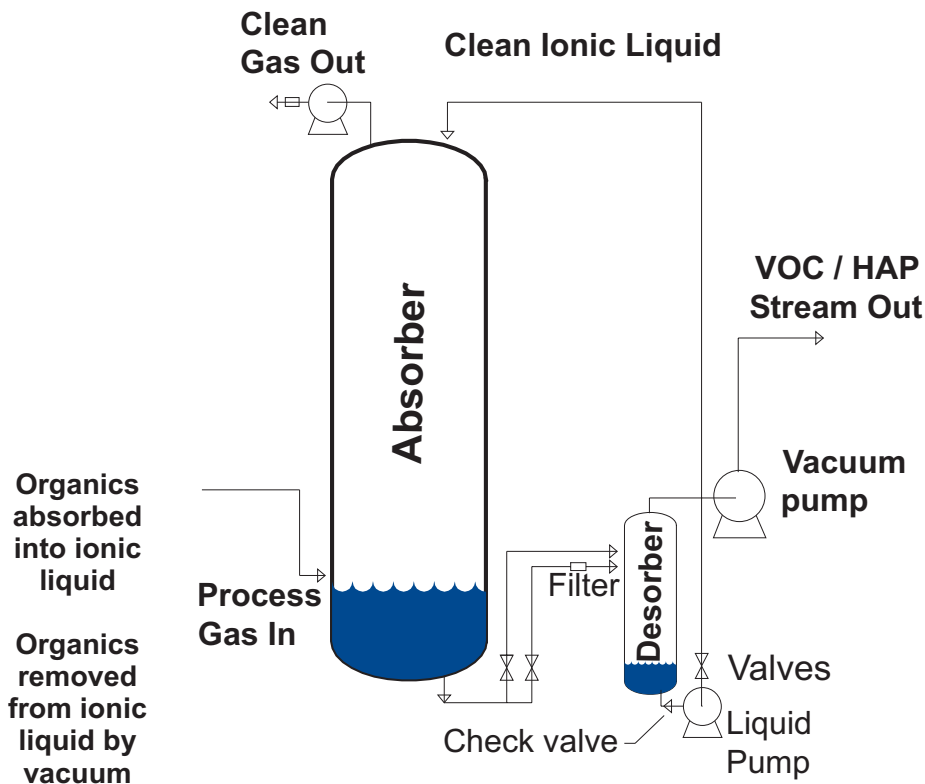
A new technology promises to remove VOCs and HAPs from wood processing exhaust gases by absorbing them into a regenerative room temperature ionic liquid (RTIL). This technology will use significantly less energy than current technology and provide the collected pollutants in a concentrated stream that can be burned for fuel or distilled into products.

Benefits

- 60% reduction in natural gas use
- Reduction of electrical consumption
- Additional savings due to fuel recovery
- Reduced capital and operating costs
- CO_2 emission reduction
- No formation of NO_x

Applications

Ionic liquid absorption technology can be used to remove VOCs and HAPs from air streams, replacing the removal systems that are currently being used by the wood processing industry.



Proposed technology for VOC and HAP removal

Project Description

Goal: Develop a RTIL absorption system for removal of VOCs and HAPs from exhaust streams at wood product facilities.

The projects objectives are to:

1. Synthesize RTILs and optimize their chemical structures for a VOC/HAP absorption process.
2. Evaluate the solubility and removal of VOC compounds in the synthesized RTILs and determine other chemical and physical properties important for absorption.
3. Construct a continuous prototype absorption system using the RTIL most suited for VOC removal.
4. Determine the ability of the RTIL to clean exhaust during long-term trials on wood dryer and press exhaust.

Progress and milestones

Preliminary results at Oregon State University reveal that fatty acids and resins could dissolve in RTILs and would not reduce the solubility of other VOCs and HAPs.

Unique RTIL properties that have been identified:

- VOCs that are dissolved in the RTILs can be selectively and readily removed under reduced pressure.
- High solubility of a wide range of organic compounds
- Thermal stability to 200°C and high chemical inertness to VOCs and HAPs
- Immiscible with water

Project Partners

Oregon State University
Weyerhaeuser Corporation
Louisiana Pacific Corporation
Boise Cascade Corporation

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